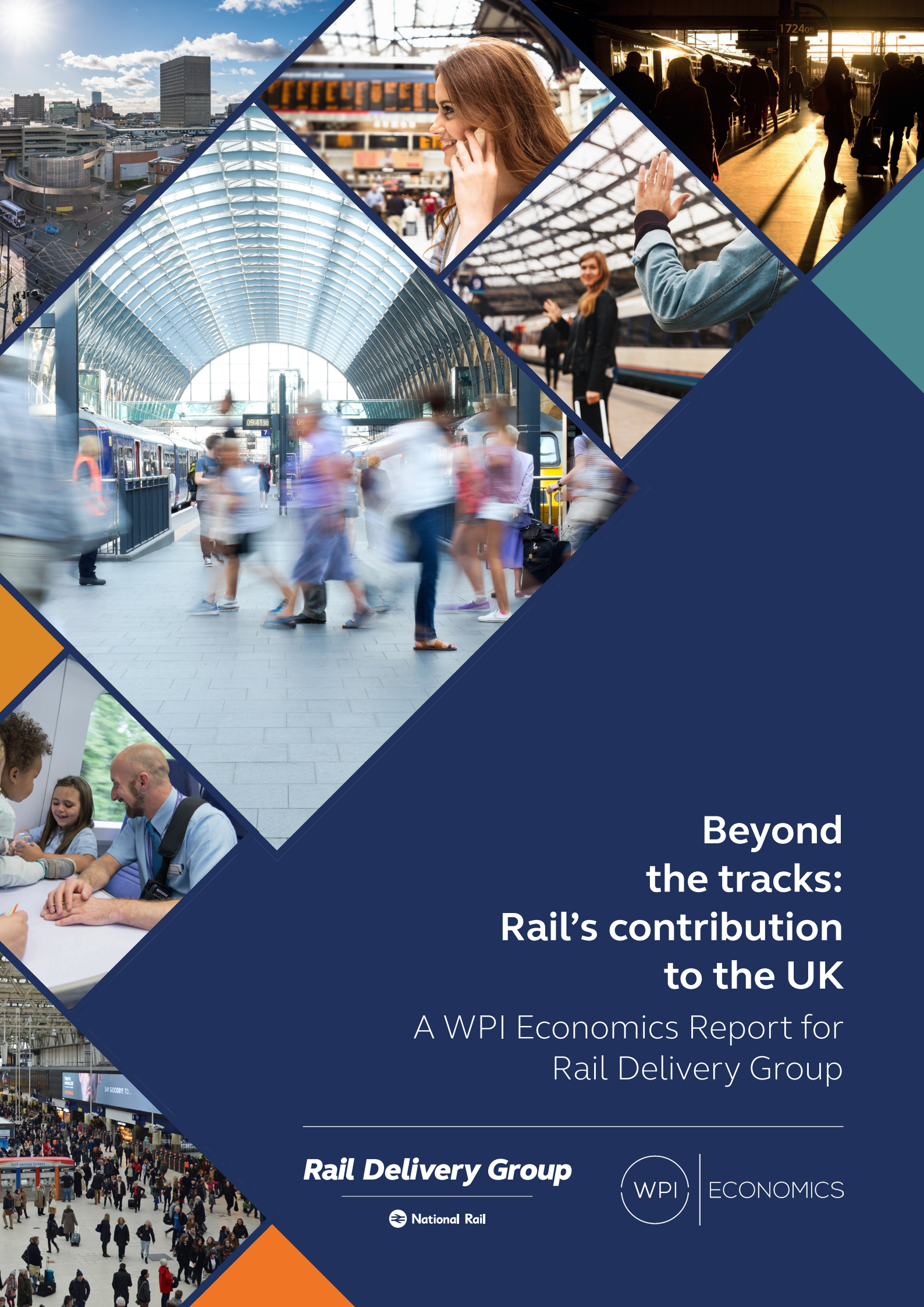

Beyond the tracks: Rail's contribution to the UK

A WPI Economics Report for Rail Delivery Group

Rail Delivery Group

National Rail

WPI ECONOMICS


JOULES

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Foreword

Value of rail

The UK rail industry does more than simply get us from A to B. By carrying three million people on average every day, it plays an essential role in connecting communities, driving economic growth, and contributing to a more sustainable future. The way we travel, work and socialise today has changed drastically since 2020, and that has understandably had an impact on our railways. But instead of comparing to how things used to be, we must focus on how they are now, and the continued importance of rail to the UK's economy, communities and a greener tomorrow remains.

This report shows that rail has the potential to deliver even more as a major driving force for our country's growth; connecting communities, bringing together businesses, providing a track to net zero and creating jobs for the future. It also shines a spotlight on the importance of rail customers to local economies. The spending in and around local stations is creating microeconomies that are benefitting Great Britain's high streets, independent businesses and economic growth both locally and on a national level.

Unlocking the full potential of the railways will require a collective shift in mindset that puts customers at the heart of how we provide services. The progress towards establishing Great British Railways provides the opportunity to create a more collaborative culture within the rail industry. Collaboration will be vital if we are going to make progress on the important issues that matter – having a reliable service, simplifying fares and ticketing, and making rail more accessible for everyone.

To meet this challenge the industry must be equipped with a diverse range of talent to provide the skills that will drive improvements. The rail industry already makes an impressive contribution to our economy, providing excellent career opportunities. Rail should be a destination employer for future generations looking for a career in a dynamic industry.

Achieving growth will be challenging, but the evidence in this report is clear that the railways are an essential part of growing our economy and local businesses, creating connections for communities and taking significant steps towards net zero in Great Britain.

Jacqueline Starr,
Chief Executive Officer of Rail Delivery Group

"Rail has the potential to deliver even more as a major driving force for our country's growth; connecting communities, bringing together businesses, providing a track to net zero and creating jobs for the future"

Harnessing the value of rail: key facts on the potential for growth

Value of rail

The value of the railways to the economy, the environment and society more broadly currently stands at **£26bn** in benefits delivered each year:

- The total benefits to passengers are worth **£14bn** each year.
- The total value of decreased congestion is worth **£8bn** to people and businesses each year.
- **£4bn** additional benefits from environmental and social benefits and wider economic impacts.

Potential for growth

A **40%** growth in passengers by 2035 could see:

- the total value of the railways reach **£46bn** in annual benefits.
- a **1.8Mt** decrease in greenhouse gas emissions per year.
- **320m** additional hours of road congestion relieved each year, on top of the existing **720m.**
- **1,100 casualties** avoided in addition to the **2,700** already avoided annually due to current rail use.

Wider economic benefits

- The direct employment contribution of the rail sector is over **103,000** jobs.
- Passengers surveyed reported they spend on average **£80** per complete journey.
- Based on the **1.23** billion passenger journeys taken in 2022/23, this means that rail customers could be contributing **£98bn** annually to local economies.
- **57%** would like to see a greater presence of independent businesses in and around stations.
- **73%** see their local station as important to helping the local economy and businesses to thrive.

Executive Summary

Great Britain's railways contribute significantly to the economic success of the country: this report sets out the evidence that shows just how much. Today, the railways directly employ over 103,000 people, facilitate over 3 million passenger journeys daily across more than 19,000 miles of track, and enable highly productive city centres to function effectively. It does more than simply get us from A to B – it underpins local economies, facilitates jobs, and plays a role in local communities.

How rail customers use the railways continues to evolve: travelling into the office five days a week has become less common; the network has seen an increase in the volume of people using rail for leisure purposes at the weekend; and what people are spending most of their money on when they travel has changed too. Recovery is, though, well underway – in 2022/23, **there were 1.23 billion rail passenger journeys**[1],a 37% increase on the 894 million journeys in 2021/22.

This is the context in which Rail Delivery Group (RDG) commissioned this research. RDG wanted to explore the value rail is adding to the economy, environment, and wider society now, how this sits within the changes in passenger behaviour, and how rail's potential as an economic and societal contributor could be expanded into the future. RDG wanted to explore these existing positive impacts and where potential lies for investment in customer experience and services to support an enhanced growth picture.

The value of the railways to the economy, the environment and society more broadly currently exceeds £26bn in benefits delivered each year

The central finding of this research is that the combined **value of the railways to the economy, the environment and society more broadly currently exceeds £26bn in benefits delivered each year**[i]. Beneath that headline total:

The total benefits to passengers are worth £14bn each year – these are the benefits that flow from people using the railways to commute to jobs, to travel to see friends and family, to get to shops and restaurants, to go on holiday, to get to places of education and a wide range of other purposes.

- £5.2bn of this is direct economic benefit, accruing to passengers travelling in the course of business.

The total value of decreased congestion is worth £8bn each year – this includes the benefits to people and businesses from reduced congestion on the roads, e.g. lorries suffering fewer delays when moving goods or tradespeople being able to do more jobs in a day due to lower congestion.

- £2.1bn of this is direct economic benefit, accruing to people travelling in the course of business.

The **additional £4bn annual benefits** included here reflect the value of decreased emissions and the wider economic impacts of rail not captured in the totals above, such as the role it plays in enabling the clustering of businesses and services together, which supports efficiency, productivity and knowledge-sharing.

[i] More detail on how we approach the analysis and what this figure includes is explained in the main report, but it refers to the total benefit from rail in 2023.

Beyond the current value of rail, there is significant potential for growth.

The Railway Industry Association (RIA) has forecast rail travel to grow by an average of 1.6% per year over the next three decades, driven by economic and population growth – this would be broadly equivalent to a 20% growth scenario by 2035. If the rail industry and the Government can deliver an improved customer offer and shifts in behaviour towards more sustainable travel, growth in rail travel could be as high as 3% per year. This is broadly consistent with the shift to public transport implied by the Committee on Climate Change's (CCC) net zero balanced pathway and would equal a 40% growth in rail travel by 2035. Looking at what these scenarios could mean for increasing the benefits of rail to the country:

Expected 20% rail growth

Supporting rail to accommodate underlying population and economic growth – carrying **20% more passengers by 2035**

40% rail growth opportunity

Delivering an improved offer and behavioural shifts could mean a **40% growth in passengers by 2035**

+£10bn

increase the **total value to over £35bn** (almost £10bn on top of the existing £26bn).

+£21bn

total value reach over £46bn (almost £21bn on top of the existing £26bn).

And looking specifically at the passenger benefits within those totals:

+£7bn

in passenger benefits.

+£15bn

in passenger benefits, over double than current passenger benefit value.

40% rail growth is needed to hit net zero transport targets, reducing 1.8Mt decrease in greenhouse gas emissions per year.

These sizeable numbers only tell part of the story of rail's value to the country. From an environmental perspective, a growth in rail use of around **40%** is needed by 2035 to **shift a minimum of 4bn car miles** to train to achieve the country's net zero targets on the Climate Change Committee's preferred pathway. Based on current emissions factors for each mode,[2] achieving a **40%** rail growth scenario by 2035 could result in a **1.8Mt decrease in greenhouse gas emissions per year**. For comparison, this is greater than the whole of domestic aviation emissions in 2019.

And there are significant benefits from a societal perspective, too: connections are facilitating how people live their lives, get to work, connect with their friends, family, and communities, and enjoy their free time. The survey commissioned for this report found **a large majority of rail customers (73%) see their local station as important to helping the local economy and businesses thrive.** As section four sets out in more detail, the railways support customers in visiting businesses, attractions and accessing services that significantly benefit the local economy:

Wider economic impact

£80 spent per journey

Passengers spend on average £80 per journey (not including rail fare) on shopping, food and drink, entertainment and culture, accommodation and other forms of onward travel.

£98bn generated for local economies

Based on the 1.23 billion passenger journeys taken in 2022/23,[3] this means that rail passengers could be contributing an estimated £98bn annually to local economies as part of their journey.

Rail passengers keeping businesses on track

To understand the impact at an even more localised level, the report also explores spending directly in and around local stations and on the local high street.

42% spend more when travelling by rail

42% of people agreed that they spend more money when travelling by rail than when travelling by other means – and that shopping in or close to the station was one of the main reasons for choosing rail travel for over a third of passengers (34%)

Importantly for local economies, spending around the departure station is not limited to spending at the station, with 59% of spending happening on the local high street

A third of passengers spend with independent businesses

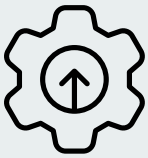
A third of people stated that they usually spend money with independent businesses when travelling by rail

Stations have the potential to play an increased role in their local area, supporting local businesses around them and on the high street and providing the services people want when they travel

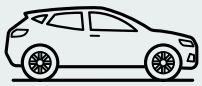
Overall, this report highlights the existing benefits of the railways and explores what an increased level of growth could achieve for the economy, environment and wider society. While achieving high levels of growth, such as the **40%** by 2035 that is modelled in this report, would require additional investment on infrastructure, there is an opportunity within the current system to accelerate growth by increasing customer numbers through the level of service provision.

To make that possible, it is important the rail industry continues its work to bolster the attractiveness of rail to customers, which means focussing on getting the basics right - from improved performance, to improving accessibility and enhancing customer experience.

Alongside future government investment in infrastructure, future growth also depends on action from the rail industry to:



improve day-to-day performance;



encourage modal shift through better integration with other modes of transport;

make rail accessible to everyone;

and continue to make improvements to the overall customer experience.

Rail has a critical role to play in the future of the country in the years to come, and harnessing its potential for growth will deliver vital economic, environmental, and social benefits.

Michael Kill

CEO, Night Time Industries Association, underscores the critical role that rail services play in bolstering the hospitality and night-time economy.

Rail services are the lifeblood of our sector, facilitating both consumer and workforce mobility. For consumers, reliable and frequent rail connections make night-time leisure activities more accessible, encouraging people to enjoy vibrant nightlife offerings without the constraints of limited transport options. This accessibility not only enhances customer experiences but also drives economic growth within the hospitality industry.

Ensuring continued investment and development in rail services is imperative to sustain and grow the night-time economy.

From an employment perspective, rail services are equally vital. Many workers in the night-time economy rely on trains for safe, timely, and affordable transportation to and from their places of employment. The availability of late-night and early-morning rail services ensures that staff can reach their destinations securely and punctually, which is crucial for maintaining the smooth operation of hospitality venues.

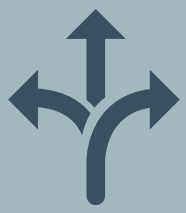
In essence, robust rail infrastructure supports both patronage and employment in the night-time economy, fostering a thriving environment that benefits businesses, employees, and consumers alike. Ensuring continued investment and development in rail services is imperative to sustain and grow the night-time economy.

The railways today and the purpose of this report

The story of rail in the UK has, over the last few years, been dominated by the response to, and the recovery from, the COVID-19 pandemic. As a result of the pandemic and its acceleration of underlying trends such as the increase in working from home for those that can[4] and online meetings, travel patterns have changed in a way that is unlikely to completely reverse.

Travel patterns have changed in a way that is unlikely to completely reverse

While fully remote working has not become the status quo, travelling into the office five days a week has become less common. The network has also seen an increase in the volume of people using rail to travel at weekends, primarily for leisure activities. As this research shows, what people spend most of their money on when travelling has also changed, and also varies by region. Recovery is, though, well underway – in 2022/23, **there were 1.23 billion rail passenger journeys**,[5] a 37% increase on the 894 million journeys in 2021/22.



1.23bn rail journeys in 2022/23

This is the context in which RDG commissioned this research. It wanted to explore the value rail is adding to the economy, environment, and wider society now, how this sits within the changes in passenger behaviour and how the potential of rail as an economic and societal contributor could be expanded into the future. RDG wanted to explore these existing positive impacts and where potential lies for investment in customer experience and services to support an enhanced growth picture.

Over time, rail use is forecast to overtake a pre-pandemic high but the extent to which it grows, and how quickly, remains to play for. Recent work for RIA[6] shows that the rate of growth could vary substantially depending on how action by industry, policymakers, and customers themselves bolsters (or otherwise) journey numbers in the years ahead.

This report looks at the impact of the rail sector on the UK economy from two different perspectives:

- Firstly, the increase in the benefit to UK society due to the existence of the rail network, known as the societal benefit. The estimates here are based on Department for Transport (DfT) appraisal guidance to estimate the net improvement in economic, environmental and social outcomes due to the rail network. In this analysis we use the term passengers to ensure it is clear when we are discussing rail users or users of other transport modes.
- Secondly, it explores the wider "economic footprint" of the sector in terms of:
  - the employment associated with the rail network, its supply chain and the economic activity generated; and
  - rail customers' spending habits when they travel by train.[ii]

[ii] Within this part of the analysis, we refer to customers to be consistent with the terminology RDG uses when looking at the future potential of a customer-centric railway.

Darren Caplan, Chief Executive of the Railway Industry Association commented:

"The UK rail industry is a driver of economic growth and productivity, contributing around £40 billion to the economy and supporting nearly 650,000 jobs, with UK rail suppliers and manufacturers at the heart of this.

RIA research commissioned by the consultancy Steer showed that passenger demand for rail travel will grow between 37% to 97% by 2050. It is therefore vital that we act now to be able to accommodate this growth by investing in new rail capacity which will unlock the economic, social, and environmental benefits in the decades ahead.

We look forward to the Government providing clarity on a long-term strategy which will help UK rail suppliers and manufacturers in delivering a better railway in the future."

This report explores the current value of rail to the economy, the environment, and communities more widely, and the difference 20% or 40% growth in the use of rail by 2035 could make to the value rail contributes to the UK. The report considers this in the knowledge that rail is about more than the value it delivers or the practical benefits of getting from A to B. As well as the overall economic and environmental gains on offer from increased usage, it delves into the impact on local areas of increased patronage in and around stations, both for the services already on offer and what future demand could look like. Over 5,000 rail customers were surveyed across the county to better understand their spending patterns generally, as well as 2,000 rail customers travelling from cities and 1,000 travelling from towns to enable us to look in depth at what they want to see in and around their local stations.[iii]

Rail's growth potential

20%

expected growth by 2035

40%

growth opportunity by 2035

By studying the value of rail in the round, this report aims to highlight the potential of boosting rail use over the next decade – particularly as this intersects with other critical debates, such as how to secure enhanced economic growth, the future of the high street and how to support thriving communities across Great Britain. It shares our findings on the potential benefits for the UK's economy and environment, in particular, and shines a light on the micro-economic impacts of rail on local communities.

[iii] For more detail on the survey approach, please see the Methodology section at the end of this report.

Harnessing rail capacity to support growth

The railway system is interwoven into Great Britain's history, economy, and society; how our cities, towns and communities have evolved, grown, and changed is, in part, a story of rail connectivity. Today, the rail industry directly employs over 103,000 people, carries people for three million journeys each day on average and allows our highly productive city centres to function effectively. It underpins local economies, facilitates jobs, and plays a role in local communities.

The types of benefits the railways deliver can be categorised into four main benefit areas, which are calculated in specific ways.

Passenger benefits

These are the benefits to passengers themselves. People use rail to commute to jobs, to travel to see friends and family, to get to shops and restaurants, to go on holiday, to get to places of education and a wide range of other purposes.

Economic benefits

This includes benefits such as people travelling by rail as part of their job, as this provides a direct benefit to their employers, and the reduced road congestion benefits other businesses through time saved. Rail travel also indirectly benefits the economy by enabling firms and potential employees to be closer in travel time to one another (agglomeration benefits) – and reducing costs for firms that use rail.

Benefits to society

Wider benefits to society include the benefits of choosing to travel by rail compared to, for example, road and air. For instance, this has environmental benefits (e.g., reduced greenhouse gas emissions, local air pollution and noise) and social benefits (e.g., reduced accidents).

Employment benefits

The rail industry itself provides employment both directly and indirectly through its wider supply chain and the induced economic activity as the wages earned are spent elsewhere in the economy.

Finally, travel by rail also influences the location of economic activity and so has a series of place-based impacts. For example, rail connections influence people's and businesses' choices over where to live and locate, with an associated impact on land values. This is borne out in a study by the University of Leeds, which quantifies how transport links enhance the attractiveness of different locations[7], and by a meta-analysis of the impact of rail stations on property value conducted by London School of Economics and Political Science.[8] The areas around stations also benefit from rail passenger spending, something we discuss in more depth in section three.

UKHOSPITALITY

"This insightful report reinforces what we know about the importance of train travel for the hospitality and tourism. Trains help bring our customers – domestic and international - and our employees to our doors, so we can deliver great experiences and boost economic growth.

We look forward to working with the rail industry to further grow the opportunities to reach all parts of our nation and spread the benefits of the hospitality sector."

Calculating the value of rail

Figure 1 below shows the interactions of these distinct benefits and how they contribute to Great Britain's economy, environmental and social welfare, or to the location of economic activity. For example, where they influence the location of economic activity but not the overall size of the economy (as is the case for the impacts in the final section in grey).

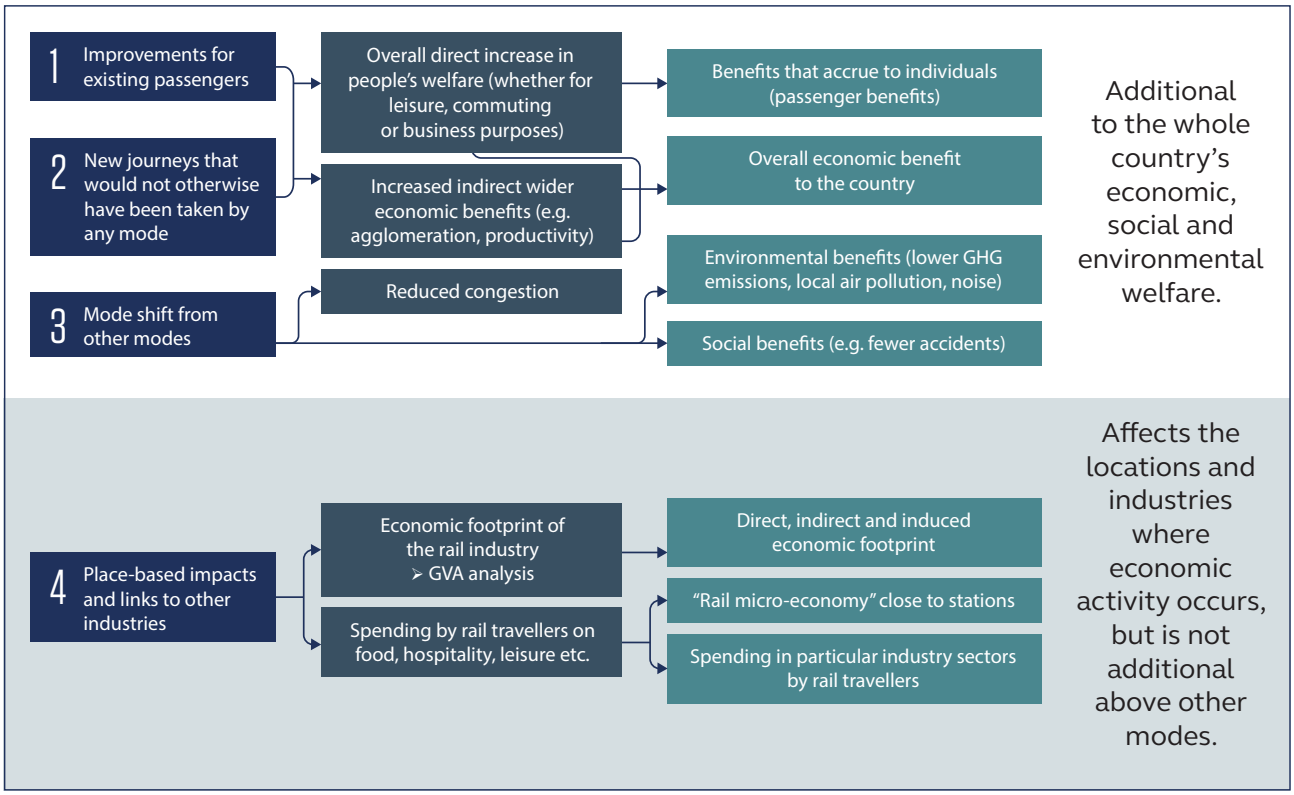


Figure 1, impacts delivered by increased levels of rail travel

This report makes quantitative estimates of the benefits of rail travel across all of these distinct types of impacts. We do this by looking at two values:

Current value: This is calculated by modelling a hypothetical 100% decline in rail passenger travel, with all trips either shifting to other modes or simply not happening anymore.[iv]

Value of increased rail travel: We have also estimated how much more value the network would bring were passenger numbers to increase following an improvement in the rail offering (such as through a combination of increased train services and new infrastructure) that kept carriage occupation levels similar to today. These scenarios are sourced using recent projections undertaken for RIA.[9] This research finds that underlying growth caused by economic growth and population increases would see rail travel grow by an average of 1.6% per year over the next three decades, whereas growth could be as high as 3% per year if some combination of an improved customer offer and broader behavioural change driven by environmental goals is delivered. For our scenarios, we have calculated what these would mean cumulatively by 2035:

- Accommodating underlying growth: Around 20% growth in rail travel by 2035. This scenario represents the benefits that would be at risk if rail were not supported to accommodate the increasing population and economic growth.
- Achieving a higher growth rate: The highest growth scenario in the RIA projections implies around 40% growth in rail travel by 2035. This is broadly consistent with the shift to public transport implied by the CCC's net zero balanced pathway.

[iv] This can only be a hypothetical approximation as in such a scenario, there would also be systemic impacts that cannot be captured in an analysis like this, such as substantial disruption to the housing market along with increasing incremental costs with greater shifts away from rail as, for example, congestion becomes worse. This means that the current value captured is likely to be an underestimate e.g. the value is likely higher, because of these wider impacts.

Passenger benefits

Value of passenger benefit today

£14bn

By bringing together all aspects that make up passenger benefits, we estimate the total passenger benefit for those people who travelled by rail in 2023 was **£14bn** per year (2024 prices), equivalent to £370 per rail user. [10]

Potential passenger benefit by 2035

20% increase

+£7bn

40% increase

+£15bn

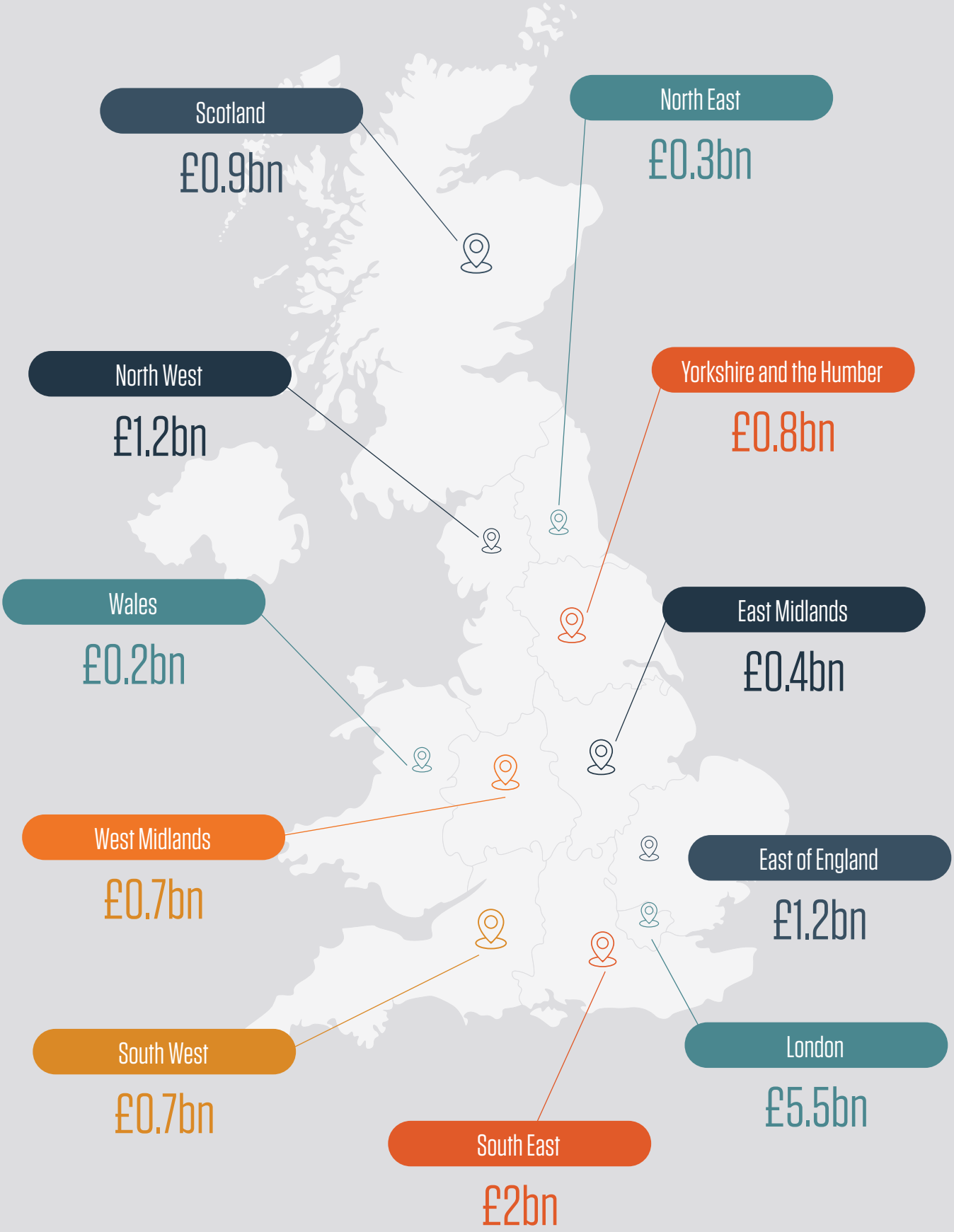
Rail plays an important part in supporting growth in the British economy. If the use of the railways increases to accommodate underlying population and economic growth, which would see it carry **20% more passengers** by 2035, this could **increase passenger benefits by £7bn**. By unlocking **40% growth** in the railways by 2035, passenger benefits could more than double, **increasing the value by £15bn.**

[10] National Travel Survey 2023 data shows that 55% of respondents use the railway at least once a year, equivalent to about 37 million people

Passenger benefits

The total passenger benefit for those people who travelled by rail in 2023 was **£14bn per year** (2024 prices), equivalent to £370 per rail user.[10]

Regionally this breaks down as follows:



Rail sector direct and wider economic impacts

Beyond the benefits that flow to passengers, rail travel impacts the economy in a wide range of other ways; for example, directly by reducing road network congestion and associated business costs and indirectly by supporting the clustering of people and businesses that support productivity (referred to as "'wider benefits" going forward).

Following DfT guidance[11], we quantified this by looking at four key areas:

Business passenger benefits

The passenger benefits that accrue to business passengers are a direct benefit to the economy – this represents time or money saved for business travellers, for example.

Congestion benefits

The direct benefits to businesses from reductions in congestion, such as lorries suffering fewer delays when moving goods or tradespeople being able to do more jobs in a day due to lower congestion.

Wider benefits

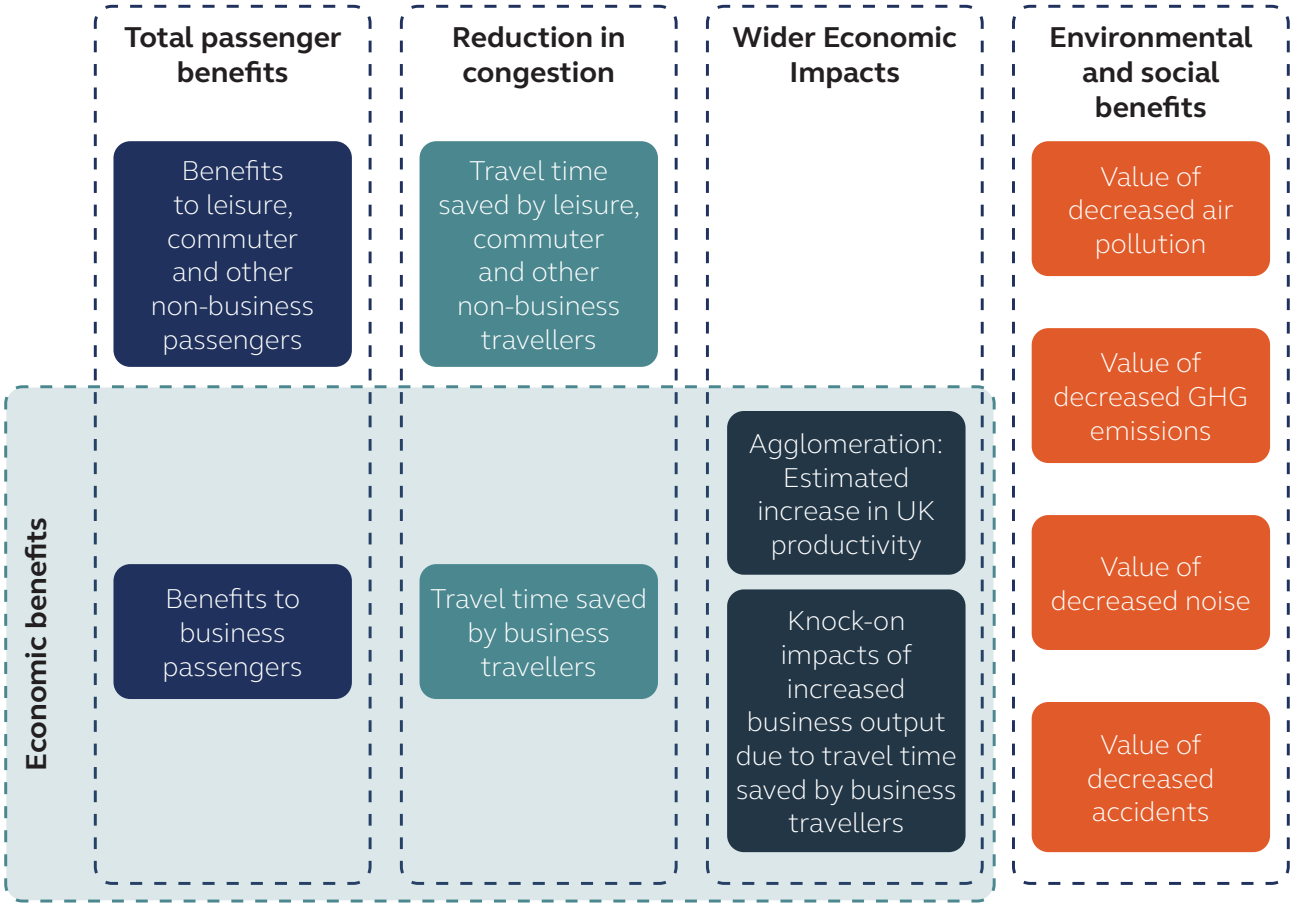
Benefits of people and businesses being in close proximity, productivity boosts that arise from a deeper labour pool, sharing knowledge with one another, and close links between supply chains and final suppliers. A key example is that reducing effective travel time between firms and the people they employ leads to increased productivity.

Increased output

A better transport system increases the productivity of firms that use rail services, leading to cost reductions for those firms and, therefore, increased output, which can support the UK's growth.[v]

[v] The business passenger benefits above already account for a large part of these benefits. However, because markets are not perfectly competitive, the value of the increased goods and services to people who buy them will exceed the business benefits. DfT guidance uplifts business passenger benefits by 10% to account for this effect.

We estimate that for these four categories of economic impact, the rail system currently delivers **benefits of £8.9bn per year – approximately equivalent to the economic impact of Newcastle every year**. The value of some of these economic benefits is captured in the total passenger benefits and reduction in congestion figures, the others fall into wider economic impacts:



Impact of rail growth

Supporting rail to accommodate population and economic growth to carry 20% more passengers by 2035 could increase this value by £3.6bn per year (at today's prices). Achieving a 40% growth by 2035 could lead to further economic benefits of £7.7bn per year (at today's prices).

All monetary figures 2024 prices	Estimating the current value	Expected 20% growth by 2035	40% growth opportunity by 2035
Rail passenger miles	44bn	**+9bn**	**+18bn**
Car miles shifted to rail	13bn	**+3bn**	**+5bn**
Benefit to the economy of decreased congestion	£2.1bn	**+£0.5bn**	**+£1.1bn**
Wider benefits: Estimated increase in UK productivity	£1bn	**+£0.3bn**	**+£0.5bn**
Business passenger benefits (the part of total passenger benefits that accrue to business passengers)[12], including knock-on impacts on business output	£5.8bn	**+£2.8bn**	**+£6.1bn**
Total economic impact	**£8.9bn**	**+£3.6bn**	**+£7.7bn**

This section covered the passenger benefits and wider economic aspects of the total value of the railways. Next, we cover the environmental and social benefits of rail before looking at the place-based impacts of the network.

"The rail network does really help business with outreach to different areas across Yorkshire, not just locally in York. It helps with our customer base, but in general we're getting a better employment group as well, so we just have a better threshold of employees to be looking at when we're looking for recruiting."

Daisy Claisse, Antiques Centre York, family-owned business in York city centre

The environmental and social benefits of rail

The rail network also delivers significant environmental and societal benefits, particularly when compared to other modes of transportation, such as cars and planes. An average train journey puts nearly five times less carbon emissions into the air than making that journey by car.[13] Put another way, choosing the train instead of a car could save the same carbon as boiling a kettle 455 times.[14] Per passenger km, passenger rail travel produces only 13% of the emissions of the average domestic air journey.[15] Phase two data from Rail Delivery Group's Green Travel Pledge, which includes carbon emissions data for over 40,000 direct station-to-station business routes (over 80,000 journeys accounting for both directions of travel) by rail across Britain, shows that carbon emissions are lower on 93.8% of those journeys compared to travelling by petrol/diesel car.[16]

Impact of 40% growth by 2035:

1.8Mt decrease in greenhouse gas emissions per year, needed to achieve net zero targets

320m hours of road congestion relieved, on top of existing 720m hours.

Almost **1,100 additional casualties avoided** on top of the 2,700 already avoided annually

Harnessing unused capacity on trains can also benefit other environmental and societal metrics, where this then reduces car and domestic plane use. For example, using this capacity from rail can help to reduce air pollution and noise from cars and planes, and the infrastructure damage from car use. Rail is also safer than car travel: DfT statistics show that there were 1.2 fatalities per billion kilometres travelled by people in cars in the period between 2013-2022, whilst for rail, there were 0.2 fatalities per billion passenger kilometres.[17]

64% of younger people aged 16-30 stated that rail enables them to travel more independently

Rail helps people get from A to B, increasing mobility, which in turn can help to improve access to services such as education, employment, and leisure, particularly for those who do not have access to a car. Across the country, rail promotes social capital and relationship building, limiting the potential disadvantages of a lifestyle restricted to the local area.[18] Almost two-thirds (64%) of younger people aged 16-30 stated that rail enables them to travel more independently compared to 55% of people aged 30+. Rail also provides connectivity to a wide range of rural locations, which can reduce social exclusion by providing access to jobs and education and providing access to a range of other social and leisure opportunities.[19] Continuing to make rail more accessible should support increased use, which will further unlock the network's social value aspects.[20]

"The fast-charging technology that we use on this train helps to unlock the potential for significant carbon reductions across the network. Because electric trains are so efficient, if you go by electric train, that's about 17 times less the emissions than going in an electric car."

Julian Fletcher, technical development manager, Great Western Railway

Calculating value of the environmental and social benefits of rail

To estimate the benefits that increased rail use would bring across these environmental and social aspects, we use the following method, looking first at the impacts for the current network and then for the growth scenarios – growth in rail use of 20% by 2035 and growth in rail use of 40% by 2035.

Model scenarios for an increase in rail passengers journeys due to a decrease in average "generalised journey cost" that could be caused by a range of factors e.g. decreased fares, increased service levels, infrastructure investment etc.

Identify the consequent change in car, bus and air miles. We then estimate the consequent change in car, bus and air miles by using "diversion factors" that provide evidence on how the use of other transport modes change when rail usage increases or decreases.

Calculate the change in greenhouse gas emissions. Using the Government's Greenhouse Gas Emission Conversion Factors we estimate the change in greenhouse gas emissions that arises from these changes in car, bus and air miles travelled netting off the change in rail emissions.

Calculate the change in other environmental, economic and social costs due to change in car traffic. We then use the Department for Transport's "Marginal External Costs" data to estimate the monetary value of changes in congestion, noise and local air pollution that arise from the reduction in car miles. We also directly estimate the change in casualties using DfT statistics on passenger casualty rates by mode.

Estimate the wider economic impacts. The economy directly benefits from reductions in congestion but rail travel also improves productivity in the economy through mechanisms such as agglomeration - benefits from firms and people being closer in travel time to one another - and reducing costs for firms that use rail. We estimate these benefits following Department for Transport guidance.

"The Rails to Roots group is a gardening group. We thought it would be a really lovely project to set up a wellbeing garden at Ridgmont Station Heritage Centre. The vision was always to become a showcase for community rail, and also become a new reason for people to travel along this lovely line."

Stephen Sleight, Marston Vale Community Rail Partnership

Net zero and moving journeys to rail

Increasing rail use has an important part to play in achieving net zero and unlocking the growth benefits that can come with this. Transport is the largest emitting sector of greenhouse gas emissions, producing 28% of the UK's total emissions in 2022.[21] Decarbonising each transport mode through electrification, alternative fuels, and other methods is crucial. However, the CCC found that would not be sufficient for net zero; it must be combined with behaviour change and a modal shift in ways of travelling.

The current total value of decreased congestion is **£8bn** – this includes the benefits to people and businesses from reduced congestion on the roads.

The CCC's preferred pathway to net zero includes a shift from car travel to public transport that ranges between 2% and 4% of total car miles by 2030 and between 5% and 8% by 2050 (relative to the baseline scenario without net zero policies).[22] Using DfT's National Road Transport Projections 2022, we estimate that this implies between 15bn to 24bn car miles shifted to public transport by 2050.

Currently, rail accounts for almost 70% of passenger miles travelled by public transport as a whole.[23] If we assume that rail will play a role in the modal shift to public transport proportionate to its current share, this implies that between 4bn and 7bn of car miles per year will need to shift to rail by 2035 to stay on target.

The results for the scenarios are shown in the table below. This shows that a 40% growth in rail travel by 2035 is broadly consistent with the CCC's balanced pathway. Using the current emissions factors for each mode,[24] this could achieve a **1.8Mt decrease in greenhouse gas emissions per year**. For comparison, this is greater than the whole of domestic aviation emissions in 2019.

A growth of rail use of around 40% is needed by 2035 to shift a minimum of 4bn car miles to train to achieve the country's net zero targets.

All figures annual	Estimating the current value	Expected 20% growth by 2035	40% growth opportunity by 2035
Rail passenger miles	44bn	+9bn	+18bn
Car miles shifted to rail	13bn	+3bn	+5bn
Bus passenger miles shifted to rail	10bn	+2bn	+4bn
Air passenger miles shifted to rail	4bn	+1bn	+2bn
Greenhouse gas emissions (Tonnes CO2e)	4.5Mt	0.9Mt fall	1.8Mt fall

Note: Some rail travel would be new journeys that would not have happened otherwise, so the total change in other modes does not match the increase in rail miles

Other environmental and social impacts

Using the methods described in the graphic above, it is also possible to quantify the scenarios' impact on congestion, local air pollution, accidents, and noise. The table below shows these results, but the true impact could be even higher.[vi]

All figures annual, all monetary figures 2024 prices	Estimating the current value	Expected 20% growth by 2035	40% growth opportunity by 2035
Rail passenger miles	44bn	+9bn	+18bn
Car miles shifted to rail	13bn	+3bn	+5bn
Cost of congestion relieved	£8bn	+£2bn	+£4bn
Hours of congestion relieved	720m	+160m	+320m
Value of air pollution avoided due to rail travel	£80m	+£10m	+£20m
Value of prevented accidents	£250m	+£60m	+£120m
Value of decreased noise	£40m	+£10m	+£20m

The costings in the table above follow DfT guidance on how to estimate the monetary value that people place on these factors through a range of methods:

- **Congestion:** This represents time lost that could have been put to other purposes.[vii]
- **Local air pollution and noise:** The impacts of local air pollution and noise can be valued through analysing the damage caused by such pollution, the impacts that the damage has on health, economy and the environment, and then valuing changes in these impacts through a range of methods.[viii]
- **Accidents:** An established method in cost-benefit analysis is the use of the "Value of Preventing a Fatality".[ix] DfT publishes guidance on the value of preventing a fatality in the UK.[25]

[vi] As before, the figures for the current value are likely to underestimate the true impact as we cannot model factors such as the substantial systemic impacts implied by such a scenario or the non-linear increases in congestion that would occur.
[vii] The DfT produces evidence on the value of time based on rigorous "stated preference" survey methods that present individuals with travel choices and infer how much they value travelling quicker.
[viii] For example, how much people value the annoyance of noise is inferred from how house prices in noisier environments change, taking account of other factors.
[ix] This is a measurement of how much society is willing to pay for policy interventions that reduce the risk to people of fatal incidents, based on several methods, including, for example, people's choices when shown options that cost more but reduce the risk of travel.

Rail reduces casualties

Looking specifically at prevented accidents, we use DfT statistics on the casualty rates of different transport modes[26] to estimate how many casualties would be avoided as a result of increased rail use:

	Impact of current rail network	Expected 20% growth by 2035	40% growth opportunity by 2035
Severity	**Estimated casualties avoided per year compared to no rail network**	**Estimated additional casualties avoided per year**	**Estimated additional casualties avoided per year**
Fatal	56	11	22
Serious	136	27	54
Slight	2,522	504	1,009
All severities	**2,714**	**543**	**1,086**

Almost 1,100 additional casualties would be avoided in a 40% growth scenario, on top of the 2,700 already avoided each year due to existing rail use

The GVA, employment and local community benefits of rail

£8.1bn GVA from rail sector in 2023

over **103,000** jobs from direct employment contribution

average rail customer spend of **£80** per complete journey (not including fare)

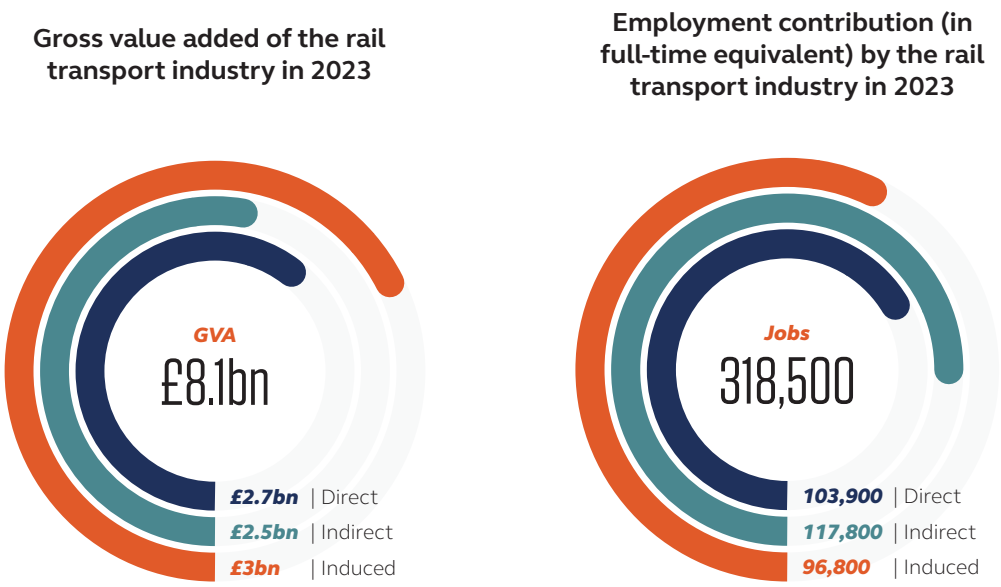
£98bn brought annually to local economies as part of customer journeys

As noted earlier in the report, travel by rail also influences the location of economic activity and so has a series of **place-based impacts**. For example, rail connections influence people's choices over where to live and businesses' choices over where to locate. The areas around stations also benefit from rail customer spending, something we discuss in more depth in this section.

The rail sector's recovering GVA

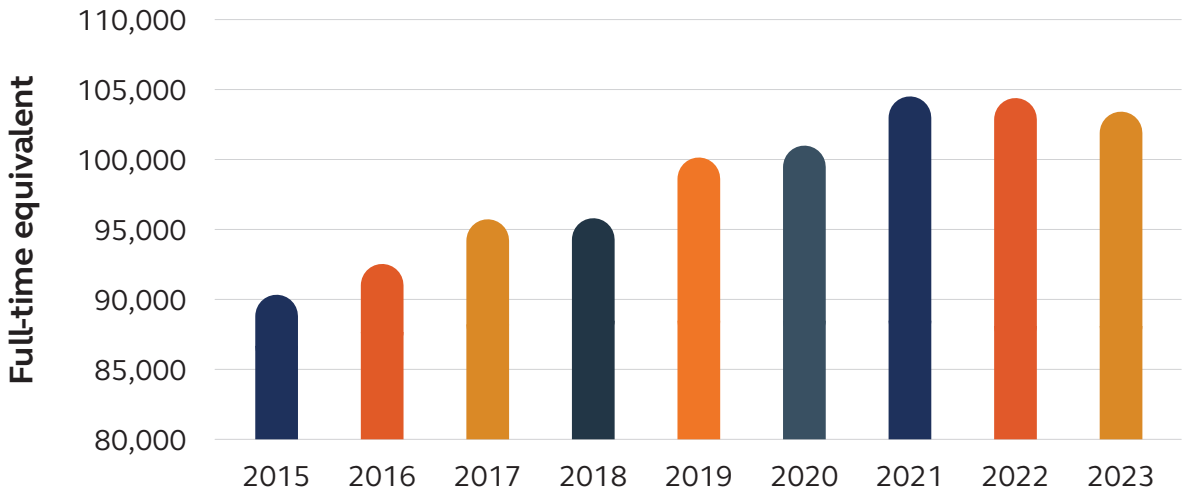
Recovery is underway in GVA terms, with GVA for the rail transport sector reaching £8.1bn in 2023. However, GVA has not yet returned to pre-pandemic levels, in part due to revenue levels remaining down - which in itself reflects changes to how people travel and when - and in part due to changes in overall journey numbers, which are at around 93% of the pre-pandemic total.[27]

Figure 2, total GVA for the rail transport sector and total employment contribution in 2023.



However, employment figures proved more resilient to the pandemic compared to GVA, given the need to maintain staffing at a certain level even when journey numbers are lower. The total number in employment (direct impact) is rising over time, as figure 3 shows, with consistent job growth indicating that the rail sector's wider impact is broadly back on track.

Employment in the rail sector over time (to 2023)



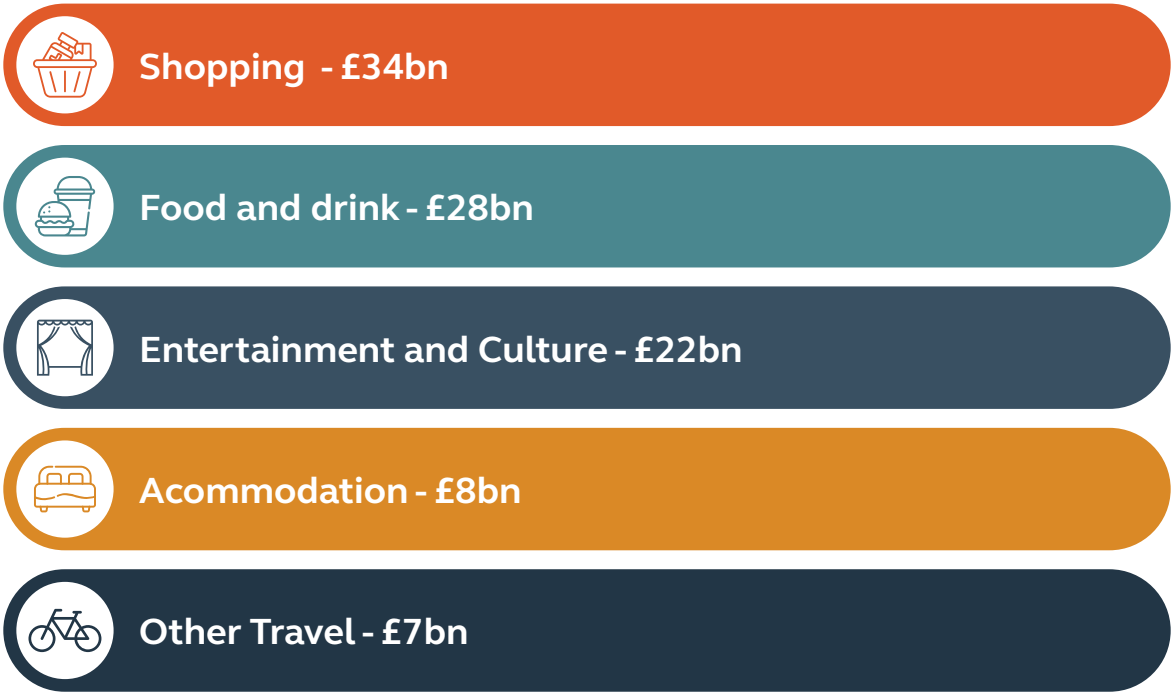
The total number of jobs supported by the rail industry reached 318,500 in 2023.

Spending by rail customers in local economies

Beyond the economic impacts explored, there are more localised place-based benefits that flow to the local economy from having a station nearby. For this research, a survey of 5,000 rail customers was commissioned to explore how their spending behaviours benefit their local economies and beyond. A large majority of rail customers (73%) see their local station as important to helping the local economy and businesses to thrive. A further 51% of people agree that businesses in and around the station play an important role in their local community.

Rail customers spend on average £80 per journey (not including rail fare), which reflects the money they spend with local businesses, services and on experiences.[x] Based on the 1.23 billion passenger journeys taken in 2022/23, this means that rail customers could be contributing an estimated £98bn annually to local economies as part of their journey.

Rail passengers spending



Rail customers spent the largest proportion of their money on shopping (£27) followed by food and drink (£22), which is a reversal compared to pre-pandemic journeys. The average rail customer journey also included spending £18 on entertainment and culture. Given the ongoing post-pandemic recovery challenges in many areas, the concentration of rail customers' spend on physical retail and hospitality is particularly important for local economies and communities.[28]

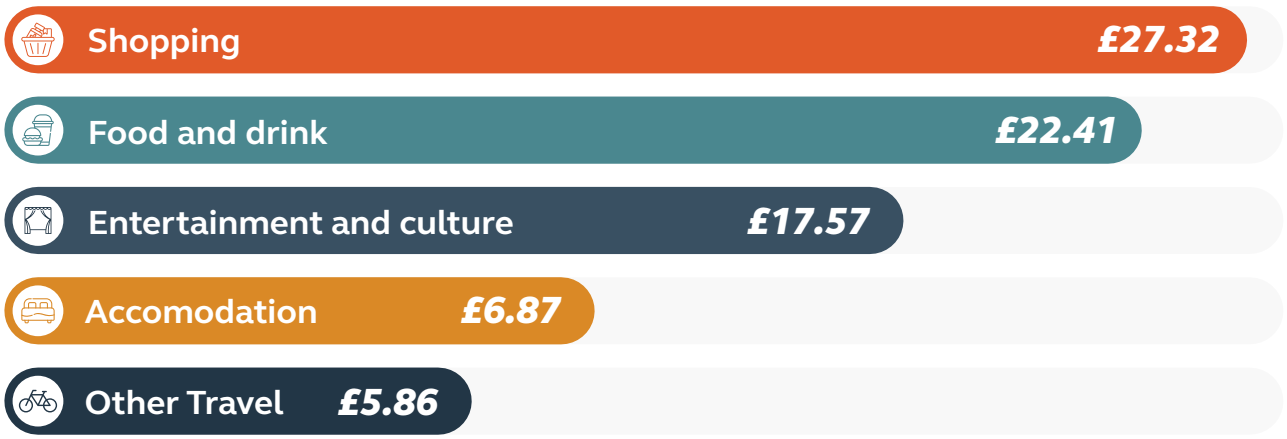
A large majority of rail customers (73%) see their local station as important to helping the local economy and businesses thrive.

[x] This encompasses the outward leg, return leg (if any) and spending at the destination.

"Being inside the station is good for us because we've got so many potential customers walking past about 15,000 to 55,000 people per day. Rail is very important to the local economy because it brings in a lot of potential money."

Jamie Savage, Menz Room barbers in Manchester Victoria Train Station

Average rail customer spending per journey



Rail travel contributes to local economies nationwide

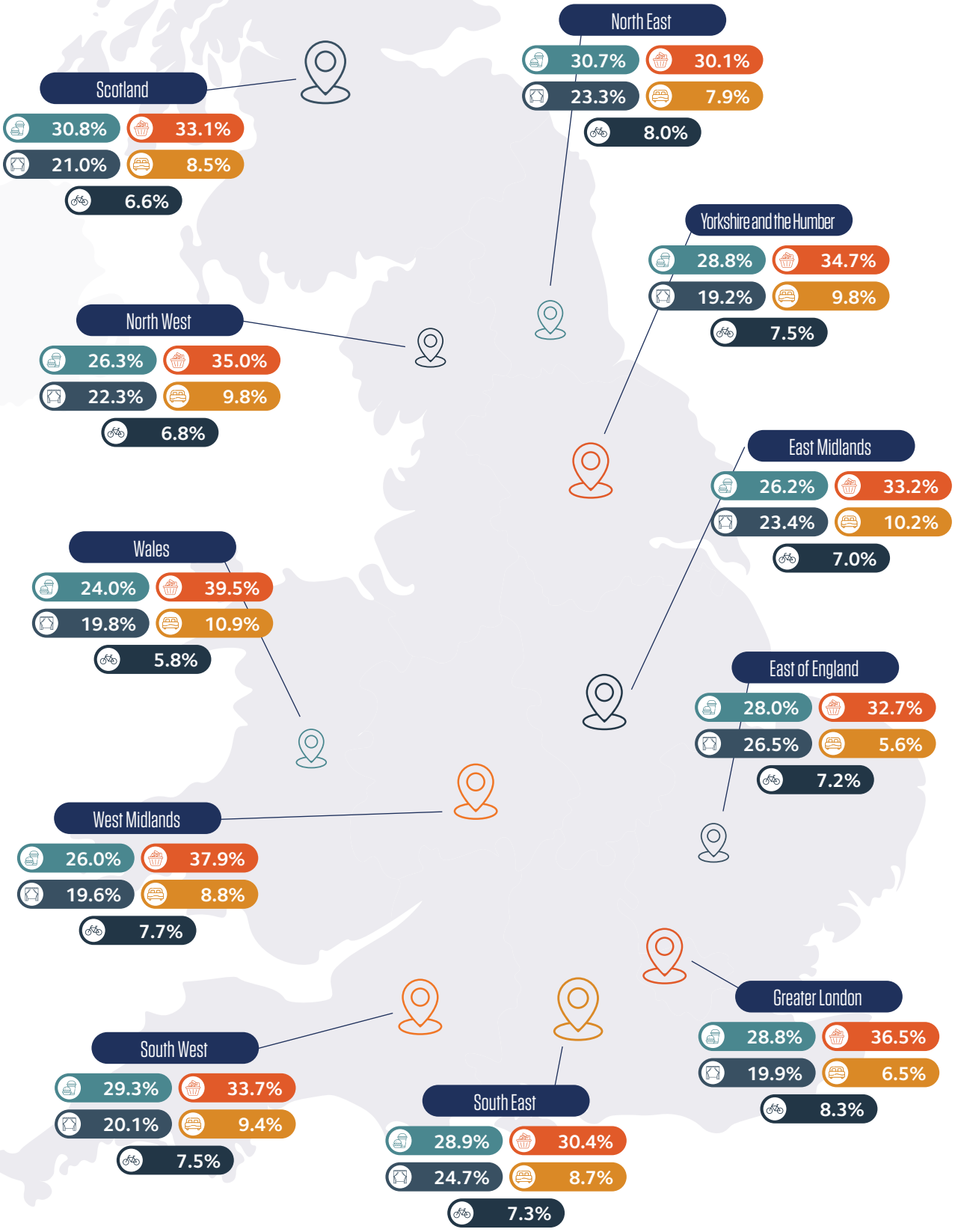
The benefits of rail travel to local economies and communities can be seen across the country. Although cities receive the largest contributions in the form of rail customer spending, towns and coastal areas across all regions benefit from rail travel.

Region	Food and drink establishments	Shopping	Entertainment and culture	Accommodation	Other Travel	Total
North East	£300m	£300m	£230m	£80m	£80m	**£990m**
North West	£2,040m	£2,720m	£1,730m	£760m	£530m	**£7,770m**
Yorkshire and the Humber	£1,130m	£1,370m	£750m	£390m	£300m	**£3,940m**
East Midlands	£560m	£700m	£490m	£220m	£150m	**£2,120m**
West Midlands	£1,300m	£1,890m	£980m	£440m	£390m	**£4,990m**
East of England	£1,810m	£2,110m	£1,710m	£360m	£460m	**£6,460m**
Greater London	£13,800m	£17,470m	£9,550m	£3,100m	£3,970m	**£47,890m**
South East	£2,900m	£3,040m	£2,480m	£880m	£730m	**£10,030m**
South West	£800m	£920m	£550m	£260m	£200m	**£2,730m**
Wales	£330m	£550m	£270m	£150m	£80m	**£1,390m**
Scotland	£1,640m	£1,760m	£1,120m	£450m	£350m	**£5,330m**

Figure 6: Gross benefits from rail customer spending by English region, Scotland and Wales

Rail customer proportion of spending by region

There are some notable differences in where rail customers spend money in the local economy on a regional basis. While most regions of the UK spend more on shopping than on food and drink, the reverse is true for rail customers from the North East, where food and drink is the highest category of spending. Entertainment and cultural activities make up the highest proportion of spending in the East of England (27%), where it is almost on the same level as spending on food and drink. These types of insights can help to inform how future investment in the local economy is directed in various locations.



Leisure journey spending by destination

The majority of rail customer journeys across all regions in our survey are for leisure purposes (61%), and the research shows some noticeable differences in spending levels in different local economies according to the destination type. For example, spending in cities (£94) and at the seaside (£85) is notably higher than when people travel to rural areas (£71) and non-coastal towns and villages (£63). People travelling to cities spend similar amounts on food and drink (£26) as people travelling to the seaside (£26), but they spend more on shopping (£31) and entertainment and culture (£25). However, among people who spent money on accommodation, people travelling to coastal areas spent the most - £50 compared to £46 in rural areas and £43 in cities.

Figure 8: Average rail customer spending per leisure journey by destination

Spending in and around train stations

Something that has received less attention is the role that stations play in building and maintaining strong local economies in UK cities and towns, which this report refers to as local "microeconomies".

To explore this in more detail, as part of this research, rail customers departing from 20 selected cities (2,000 rail customers in total) and 20 selected towns (1,000 rail customers in total) were asked about their spending around their departure station (for more detail, see the Methodology section).

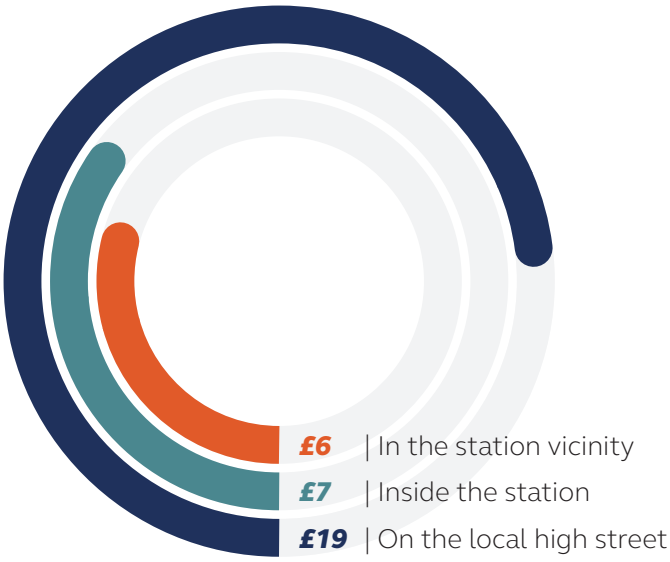
This found that rail travel is a better spending driver than other modes of transport:

Average rail customer spending near the departure station

42% of people agreed that they spend more money when travelling by rail than when travelling by other means.

Shopping in or close to the station was one of the main reasons for choosing rail travel for over a third of passengers (34%).

Importantly for local economies, spending around the departure station is not limited to spending at the station, with 59% of spending happening on the local high street.



Understanding how those using the railways want to engage in the local economy is an important part of meeting their future needs and supporting economic growth around these stations. This was also borne out when exploring the relationship these rail customers have with independent businesses.

Independent businesses boosted by rail

As well as supporting local businesses and communities, people travelling by rail are providing a boost to local independent businesses:

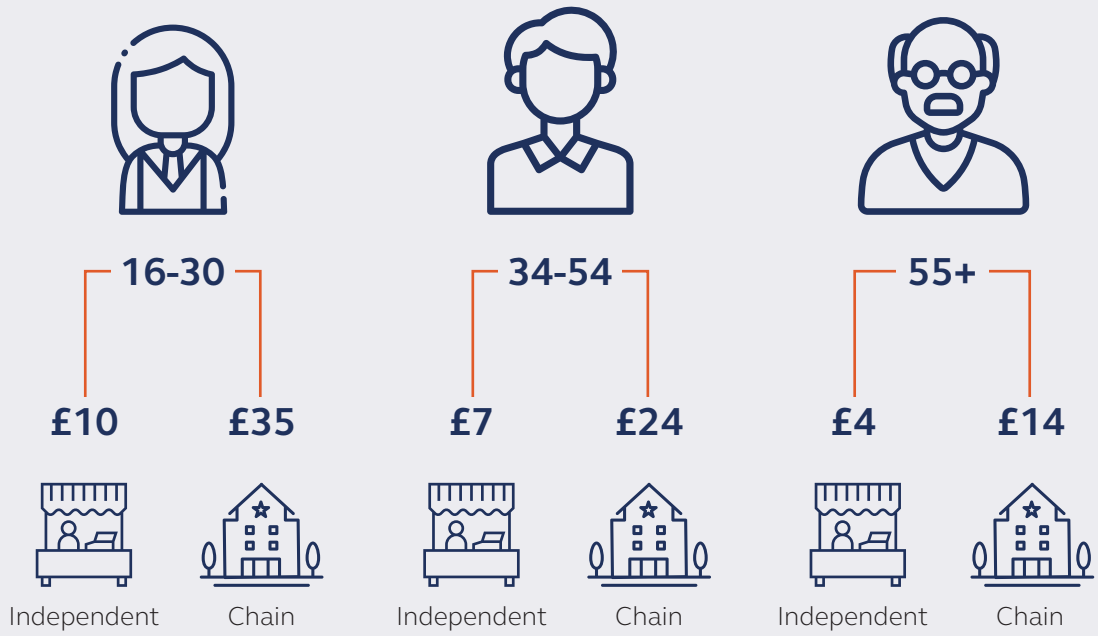
33% of people surveyed said they spend money with independent businesses when they travel by rail.

39% agreed that they would spend more with independent businesses if they travelled by rail more frequently.

Overall, people spend an average of £7 at independent businesses in and around their departure station. Given that there were 1.23 billion rail journeys in 2022/23,[29] based on the microeconomies sample of 3,000 people departing from selected cities and towns, rail travel could be contributing in the region of **£9bn** a year to independent businesses.[30]

There is also an opportunity for rail travel to contribute even more to supporting independent businesses. The majority of people (57%) would like to see a greater presence of independent businesses in and around stations. Younger age groups emerged as the biggest champions of independent business, with 58% of people aged 16-30 and 31-54 wanting to see more independent businesses in and near train stations compared to just 49% of people over 55.

Average independent business spending near departure station by age group



Given that people aged 16-30 and 31-54 spend notably more overall (£45 and £31 respectively) than people aged 55+, this indicates potential demand for a broader mix of businesses within and close to stations, as well as on the high street.

"We love being located near Llandudno Station, as most visitors to the town literally have to walk past our front door. Our town has a population of about 20,000 people, and we have about 65,000 visitors a year. So the station literally helps bring those people to us. Train stations are vital to businesses like us. At the end of the day, we are a small business and we are a charity, so we rely on people coming through the door to be able to sustain ourselves."

Clare Harding, Mostyn Gallery located just outside Llandudno station

The potential for growth: the future value of rail

The country would benefit significantly – economically, socially, and environmentally – if rail use could grow in line with the upper estimates modelled in this report rather than at the underlying growth rate. Increased rail use can support economic growth: the total benefit of achieving the more ambitious **40% growth** in rail travel by **2035 is £21bn** in addition to the **£26bn** estimated current value. This enhanced value includes rail's ability to support improved productivity as well as providing a whole host of environmental and social benefits, as the table below details:

All figures annual, all monetary figures 2024 prices	**Estimating the current value**	**Expected 20% growth by 2035**	**40% growth opportunity by 2035**
Total passenger benefit	£13.7bn	**+£6.7bn**	**+£14.5bn**
Value of decreased congestion	£8.4bn	**+£2.2bn**	**+£4.4bn**
Wider economic impacts (impact on productivity and knock-on benefit from decreased congestion on business output)	£1.6bn	**+£0.5bn**	**+£1.1bn**
Value of decreased greenhouse gas emissions	£1.6bn	**+£0.4bn**	**+£0.7bn**
Value of decreased air pollution	£0.08bn	**+£0.01bn**	**+£0.02bn**
Value to society of prevented accidents	£0.25bn	**+£0.06bn**	**+£0.12bn**
Value of decreased noise	£0.04bn	**+£0.01bn**	**+£0.02bn**
Total quantified value	**£26bn**	**+£10bn**	**+£21bn**

Alongside these benefits and the additional employment benefits explored in section four, there are significant potential benefits to local economies from higher footfall in and around the station. This means increased rail use also has the potential to help to revitalise local areas. The survey commissioned for this research found that the high street benefits significantly from rail customers, so an increase in travelling by rail and growth in rail use could play an important part in shoring up the viability of local retailers, service providers and independent businesses, all of whom play a significant role in their communities.

Overall, this report highlights the existing benefits of the railways and explores what an increased level of growth could achieve for the economy, environment and wider society. While achieving high levels of growth, such as the 40% by 2035 that is modelled in this report, would require additional investment in infrastructure, there is opportunity within the current system to accelerate growth by increasing customer numbers through the level of service provision.

To make that possible, it is important the rail industry continues its work to bolster the attractiveness of rail to customers, which means focussing on getting the basics right - from improved performance, to improving accessibility and enhancing customer experience.

Alongside future government investment in infrastructure, future growth also depends on action from the rail industry to:

- improve day-to-day performance;
- encourage modal shift through better integration with other modes of transport;
- make rail accessible to everyone[31]; and
- continue to make improvements to the overall customer experience.

The total additional passenger and economic benefits that could be realised under a 40% scenario are £21bn on top of the existing £26bn.

There is an opportunity to act now to realise this 40% scenario, which would, in turn, support economic growth, the journey to net zero and underpin the future of local economies across the country.

Methodological summary

This methodology annex includes details of our analysis in the following areas:

- Establishing counterfactual scenarios
- Private benefits of rail use: the benefits that accrue directly to passengers
- Externalities of rail use: the benefits of rail use that accrue to wider society. These include:
  - Economic benefits, including both the direct benefit of reducing congestion and wider economic benefits
  - Social benefits
  - Environmental benefits
- Customer spending methodology
- Gross Value Added and employment

Counter-factual scenarios

We have taken two approaches to establishing counter-factual scenarios for our analysis:

- **Analysing the current value of the network:** We follow the approach previously taken by Oxera for RDG[32] to estimate the current value of the rail network by analysing a hypothetical decline of 100% in rail passenger travel, with all trips either shifting to other modes or simply not happening any longer. In reality, in such a scenario, there would also be systemic impacts that cannot be captured in an analysis like this, such as substantial disruption to the housing market. We would also see substantial non-linearities in costs, such as congestion costs, which increase non-linearly with additional traffic. However, in common with Oxera, we do not have enough evidence to know to what extent the demand curve for rail would be non-linear nor the information to model non-linear congestion costs, as this would require assumptions about how the change in rail travel had arisen. We, therefore, make the simplifying assumption of a linear demand curve for rail and constant marginal costs. This means that the values captured are likely to be underestimates, particularly for the current value scenario.
- **Analysing the value of increased rail travel:** We have also estimated how much more value the network would bring were passenger numbers to increase following an improvement in the rail offering (such as through a combination of increased train services, lower fares, and new infrastructure) that kept crowding levels similar to today. These scenarios are sourced using recent projections undertaken for the Railway Industry Association.[33] This research finds that underlying growth caused by economic growth and population increases would see rail travel grow by an average of 1.6% per year over the next three decades, whereas growth could be as high as 3% per year if some combination of an improved customer offer and broader behavioural change driven by environmental goals is delivered. For our scenarios, we have calculated what these would mean cumulatively by 2035:
    - **Accommodating underlying growth:** Around 20% growth in rail travel by 2035. This scenario represents the benefits that would be at risk were rail not supported to accommodate increasing population and economic growth.
    - **Achieving a higher growth rate:** The highest growth scenario in the RIA projections implies around 40% growth in rail travel by 2035. This is broadly consistent with the shift to public transport implied by the Committee on Climate Change's net zero balanced pathway.

Private benefits of rail use

People and businesses across the country benefit from using rail to access work, leisure, and other opportunities; this may be through wages received for work, enjoyment derived through leisure or other benefits to wellbeing derived from accessing services, shops, and educational establishments, etc. Businesses also benefit directly through their employees using the rail network to, for example, meet with clients, visit work sites, or explore new business opportunities. Businesses also benefit from people's ability to work on train journeys, where that is possible. These benefits accrue to the individual or organisation paying for the journey.

Passengers incur the cost of this travel, including both fares and other costs, such as the value of the time the journey takes. Hence the net benefit to society is the private benefit net of costs, often measured as generalised journey time. In transport appraisal, this is measured as consumer surplus.

We follow standard transport appraisal methods to estimate the change in consumer surplus for each of our scenarios with the following method:

- **Collect data on:**
  - Station-to-station "Generalised Journey Time"[34] from the DfT's Rail Usage and Drivers Dataset (RUDD) for 2018/19 (this was the latest year available at the time of our work, and data on GJT is not likely to change significantly between years for most flows). Generalised Journey Time (GJT) is an estimate of the total non-fare cost to passengers[35] for a given journey[36] expressed in the common unit of minutes of time. The RUDD dataset covers the busiest 2% of all station pairs in the country, which represent around 80% of all passenger flows.
  - Station-to-station passenger flows from the ORR's Origin and Destination Matrix (ODM). We use 2022/23 data as the latest available at the time of our work. Whilst this is not the same year as for RUDD, data on GJT is likely to change slowly, and we judged that it was preferable to use the more up-to-date passenger flows given the significant changes in travel patterns between 2018/19 and 2022/23. Passenger flows are recorded in the ODM in terms of number of journeys from the origin station to the destination station. The ODM contains records for all station-to-station pairs in the country. For the bulk of our analysis, we utilise a subset of the full dataset, which includes only those station pairs that are recorded in the RUDD.
  - Station-to-station fare data from LENNON (Latest Earnings Networked Nationally Over Night) sales data. We used data on the average fare per journey for all station pairs that are recorded in the RUDD.
- **Prepare the data:**
  - As the most complete data source in terms of station-to-station pairs, we use the ODM as the master dataset, bringing in GJT estimates from the RUDD by merging on National Location Code (NLC). Only around 2% of station pairs in the ORR have a matching pair in the RUDD.
    - The bulk of the unmatched pairs (around 96% of all pairs) represent station-to-station flows that are rarely used, with around six or fewer journeys across a full year. We remove this group of station pairs from our dataset and adjust our final estimates to account for these missing flows (see further below).
    - A small number of unmatched station pairs (around 2% of all pairs) are high volume flows that make up around 10% of all rail journeys. Given the non negligible contribution of each of these station pairs to overall network volume, we take a more tailored approach to the imputation of GJT estimates for this second group of unmatched pairs. Noting that all pairs in this group contain at least one 'station group'[xi], we create a station-to-station group mapping. This enables us to recode NLC references in the ORR according to station group references in the RUDD, which in turn enables the successful matching of this small but important group of unmatched station pairs.
  - Fare data is then matched into this composite dataset. We first perform the merge on standard NLC codes and then repeat the process using the station-to-station group mapping.

[xi] Station group codes are used in the RUDD and other transport data to distinguish high-volume localised station networks, typically in urban centres such as London or Birmingham. In the RUDD specifically, stations that are part of a station group are subsumed under a single station, for which there is both a station group code and the NLC code of the group's reference station.

- A small proportion of the station-to-station group matched pairs do not merge successfully as a result of a slight difference in the definition of the London Terminals station group between the RUDD and the fare data. Since the number of affected flows is so small (around 180) and all of these flows are between London Terminals stations, we impute the missing fare values by taking the mean fare across all London Terminals station pairs.

» **Calculate the change in Generalised Journey Time required to cause the change in rail travel for each scenario**.
We do this through the use of GJT elasticities following the method used in previous work for the RDG by Oxera.[37] We have reviewed available evidence on GJT elasticities and note that the Passenger Demand Forecasting Handbook is the source for official recommendations. Values in PDFH vary between -0.7 to -1.45, as quoted in Wheat and Wardman (2017).[38] We use the midpoint of -1.075 and calculate that this means generalised cost needs to decrease by 9.3% to lead to a 10% rise in demand. We follow Oxera in assuming that this change in generalised cost arises from a change in service frequency, journey times and/or fares.

» **Convert generalised journey time into monetary figures:** We convert the generalised journey time figures given in RUDD to monetary figures using the Values of Time from Table A1.3.1 in the DfT TAG data book.[39] We calculate an average value of time for all rail travellers using data on the proportion of rail travel undertaken for business, leisure and commuting from the National Travel Survey.[40] For the current value of rail, we use values of time for 2024, in 2024 prices. For our two scenarios that consider potential growth to 2035, we use 2035 values of time, quoted in 2024 prices.

» **Calculate the change in consumer surplus for each station pair for each change in demand and generalised cost**, using the consumer surplus calculation included in DfT Transport Appraisal Guidance Unit A1.3.[41] This allows us to separately calculate:

- the change in consumer surplus for those who continue to travel by rail but have experienced a change in generalised cost.
- the change in consumer surplus for those who now travel by rail when they did not
- before or who no longer travel by rail (in a decline scenario).

» **Calculate the total consumer surplus change for all station pairs**. This requires two steps:

- Summing up the individual station pair calculations.
- Accounting for the fact that the RUDD dataset does not cover all station pairs.
  - As explained in more detail above, our composite dataset does not cover all station pairs in the country as the RUDD dataset does not include data for point-to-point routes selling less than £10,000 worth of ticket revenue in rail year 2017. Our composite dataset hence provides for around 80% of all passenger journeys, and our estimates of consumer surplus need to attempt to account for the 20% of passenger journeys that are not covered in the RUDD. To that end, we employ a simple adjustment, multiplying our final estimates by a factor of one plus the proportion of journeys recorded in the ORR ODM that are not recorded in our composite dataset (around 20% of journeys in the ODM).

» **Estimate the proportion of the change in benefits that accrue to business passengers:** Finally, we estimate what proportion of the change in benefits accrue to business passengers, as this is both a direct benefit to the economy and forms the basis of the calculation of the benefits of increased output described below in the Wider Economic Impacts section. To do this we use the average values of time from Table A1.3.1 in the DfT TAG databook[42] combined with data on the proportion of rail travel undertaken for each journey purpose from the National Travel Survey.[43] Combining these two sources, we can estimate the contribution to the overall average value of time that we use in the consumer surplus calculations that arise from business, commuting and leisure rail passengers. We find that 37% is attributable to business rail passengers and apply this proportion to the total consumer surplus result.

We are able to produce a regional breakdown of these benefits by assigning each RUDD station pair to a region based on either its origin or destination station. For some pairs, the origin and destination will be different, but this makes limited difference to the overall results (on average a 1.1% difference), so we use the Origin station for this breakdown.

Externalities / non-user benefits

The rail network also provides a wide range of benefits that accrue to broader society and not the person paying for the journey.

These externalities include:

- **Economic benefits:** Use of the rail network reduces congestion on the rest of the transport network, particularly on the roads. This saves people time and, in the case of business travel, translates to economic benefit from faster, more efficient travel. The rail network also provides wider economic benefits, for example, through enabling individuals and firms to be more productive as they benefit from co-locating in well-connected hubs. This benefit arises from a number of advantages that firms get from clustering together, such as learning from each other, sharing infrastructure / suppliers, etc. or improving the labour market through broadening firms' access to a wider pool of potential employees. These are often known as agglomeration effects.
- **Environmental benefits:** Rail is one of the most environmentally friendly modes of transport.
  - For every mile a person travels, passenger trains produce only around a fifth of the emissions of the average petrol car.[44]
  - Per passenger km, passenger rail travel produces only 13% of the emissions of the average domestic air journey[45]. Government figures show that average domestic air travel emissions (including indirect effects of non-CO2 emissions) are 0.237kgCO2e per passenger km compared to 0.035kgCO2e per passenger km for rail.
- **Social benefits:** Rail provides mobility, which can help improve access to services such as education, employment and leisure, particularly for those who do not have a car. Across the country, it promotes social capital and relationship building, which are important pillars of the safety net of poor people in many societies, limiting the potential disadvantages of a local and restricted lifestyle.[46] Rail also provides connectivity to a wide range of rural locations. This can reduce social exclusion through providing access to jobs and education, lowering costs, widening the search for employment, and providing access to a range of other social and leisure opportunities.[47] Rail is also safer than car travel. DfT statistics show that there were 1.2 fatalities per billion kilometres travelled by people in cars in the period between 2013-2022, whilst for rail, there were 0.2 fatalities per billion passenger kilometres.[48]

Our methodology to produce estimates of these, with a breakdown by region, is:

» **Estimate total rail miles travelled in each region in 2023**: To estimate this, we multiply the average surface rail miles per person per year for 2023 from the National Travel Survey[49] by the population in the region from the ONS.[50] Using this method we find that our estimated total rail miles travelled across Great Britain are lower than the latest data from DfT on total transport use by mode.[51] This latest data is for 2022, and we have estimated the 2023 figure by uprating the 2022 figure by 11%; the increase in rail travel per person per year in England from the National Travel Survey between 2022 to 2023. We then uprate the estimated rail travel in each region by the proportion that estimated total rail miles in Great Britain exceeds the sum of the regional figures we have calculated.

» **Model scenarios for an increase in rail passenger miles**: We model a range of scenarios for changes in rail passenger miles travelled, which we conceptualise as arising from a decrease in average "generalised journey cost" that could be caused by a range of factors, e.g., decreased fares, increased service levels, infrastructure investment etc.

» **Identify the consequent change in car, bus, and air miles**: We then estimate the consequent change in car, bus, and air miles by using "diversion factors" that provide evidence on how the use of other transport modes change when rail usage increases or decreases.[52]

» **Calculate the change in greenhouse gas emissions**: Using the Government's Greenhouse Gas Emission Conversion Factors[53], we estimate the change in greenhouse gas emissions that arises from these changes in car, bus and air miles travelled, netting off the change in rail emissions.

» **Calculate the change in casualties**: We use DfT statistics on casualty rates of different transport modes[54] to estimate the change in fatal, serious, and slight injury casualties resulting from the change in miles travelled by each mode. We produce the monetary valuation of preventing these casualties using the valuations published by DfT.[55] For the current value of rail, we use values for 2024 (in 2024 prices). For our two scenarios that consider potential growth to 2035, we use the 2035 values (quoted in 2024 prices).

» **Calculate the change in other environmental, economic, and social costs due to the change in car traffic**: We then use the Department for Transport's "Marginal External Costs" method[56] to estimate the monetary value of changes in congestion, noise and local air pollution that arise from the reduction in car miles. For the current value of rail, we use the values for 2025 (in 2024 prices), as the values are only given for every 5-year interval. For our two scenarios that consider potential growth to 2035, we use the 2035 values (quoted in 2024 prices). It is not possible to calculate the change in externalities on the rail network itself for these categories as this would require assumptions on how the increase had been achieved. For example, improvements in infrastructure would have a very different impact to reductions in fares.

» **Estimate the proportion of the change in the value of congestion costs accruing to business users**: Congestion is a direct cost to business; therefore, we want to estimate what proportion of the congestion cost / relief accrues to business users. To do this, we use the average values of time for car users from Table A1.3.1 in the DfT TAG databook[57] combined with data on the proportion of travel undertaken for each journey purpose for car users from the National Travel Survey.[58] Combining these two sources, we can estimate the contribution to the overall average value of time that we use in the congestion calculations that arise from business, commuting, and leisure rail passengers. We find that 25% is attributable to business travellers (note this is lower than the figure for rail passengers alone because business travel is a lower proportion of travel by car than it is of rail travel) and apply this proportion to the value of the congestion cost / relief found in each scenario.

Wider Economic Impacts

» Rail travel has direct impacts on the economy, such as the impact of reducing congestion and the benefits to businesses arising from their use of rail. However, it also has further impacts, known as "wider economic impacts", because the economy does not operate in a perfectly efficient way (in an economic sense). These benefits are a type of externality and are fully explained in Department for Transport guidance.[59] We have been able to extend our analysis to cover two types of wider economic impact:

» **Agglomeration benefits**: People and businesses being in close proximity to one another lead to a range of "agglomeration" economies; productivity boosts that arise from a deeper labour pool, sharing knowledge with one another, and close links between supply chains and final suppliers. A key example is that reducing effective travel time between firms and people they may employ leads to increased productivity. We follow the methodology of a previous report for RDG by Oxera to estimate these benefits.[60]

- We consider the number of new rail commuters or the number who would no longer travel as a result of the modelled changes in generalised journey time. This is calculated using diversion ratios, [61] which for commuting in metropolitan areas indicate that 19% of those switching to/from rail would not have made the journey (rather than switching to/from other modes). Commuters who divert to/from other modes (e.g. road) are assumed to continue to travel to the same destination and would therefore not affect the agglomeration benefits.
- This assumption is then combined with the estimated number of people who will work in cities in 2035 using data from the Business Register and Employment Survey (BRES) for 2022, inflating it by forecast growth to 2035 in the number of jobs from the Department for Education's Labour Market and Skills Projections[62] and the proportion of commuting that is undertaken by rail (6%).[63] The data from BRES for employment in cities does not include Scotland and Wales; we estimate the figure for Scotland and Wales by multiplying the total employment in each country by the proportion of jobs in England that are in cities.
- Combining these allows us to proxy the change in effective density due to the change in rail travel; this is a proxy measure as it is beyond the scope of this work to build a zonal model of the country. We estimate that for a 20% increase in rail travel, effective density increases by 0.22% in UK cities, and for a 40% increase, it would increase by 0.44%.
- We then use an academic estimate[64] that a doubling of effective density leads to a 5% change in productivity to calculate the benefit / cost to the economy arising from the changes in density we model. For each of our scenarios, we apply this estimated change in productivity to the total estimated GVA in all major and large cities[65] (including their Travel to Work Areas) in 2035[66], forecasting 2021 GVA to 2035 using the Office for Budget Responsibility's long-term economic determinant forecasts.[67]
- We are able to carry out this process on a regional basis by assigning each Travel to Work Area to a region based on the region that its major economic centre is in.

» **Increased output**: A better transport system increases the productivity of firms that use rail services, leading to cost reductions for those firms and, therefore, increased output. A large part of these benefits is already accounted for by direct business passenger benefits. However, because markets are not perfectly competitive, the value of the increased goods and services to people who buy them will exceed the business benefits. DfT guidance uplifts business passenger benefits by 10% to account for this effect. We use our calculation of the business user benefits described above to calculate the increased output and wider economic impact for each of our scenarios.

Customer spending methodology

Survey sample

The findings reported in this report are taken from a representative sample of 5,007 people within the UK who had travelled by rail within the last month. This sample was boosted by a further 2,017 people whose last rail journey was from one of 20 selected cities and 1,007 people whose last rail journey was from one of the 20 selected towns. The list of selected towns and cities can be found below. In this report, when reference is made to the "microeconomies" sample, it refers to the 3,024 people from selected cities and towns. The survey was in field from 09.04.24 - 13.05.24.

Estimating spending per rail journey

Survey respondents were asked how much they spent across different categories on the outward leg, at their destination and – if applicable – on the return leg. Respondents answered by selecting a range, and for our analysis, the lower end of the range is used to estimate spending levels, e.g. for the range "£10-£39", we assigned a value of £10. The exception is with the range "Less than £10", where the midpoint of £5 was used. This means that the estimates of spending levels in this report are lower bounds.

Once the level of spending on each portion of the journey has been made for each respondent, these were combined into an overall spend per person before being averaged to find the mean spending per journey. However, survey responses on spending can be affected by high levels of variance, especially in the upper end of the distribution. For this reason, the estimates in this report do not use reported spending from people whose overall spending was in the 95th percentile or higher.

In order to calculate the national contribution to spending by rail journeys, the mean spending per journey for each region is multiplied by the total number of passenger journeys in each region taken from Office of Rail and Road data reports. This accounts for differences in spending in each region and different numbers of journey in each region.

Estimating spending in and around the departure station (Microeconomies)

Survey respondents were asked how much they spent across different categories at three locations in and around their departure station: inside the station, in the vicinity of the station (defined as within 200m) and on the local high street. Calculation of mean spending per person at each location and in and around the departure station overall was done in the same way as calculations for overall journey spending (see above). To avoid double counting, we control for return journeys.

Estimating spending at independent businesses

In order to estimate the amount of spending at independent businesses, respondents were asked what proportion of their spending was at independent businesses. For each respondent, this percentage was multiplied by that respondent's total spending to give the spending at independent businesses for each respondent.

Gross Value Added and employment

To estimate the economic footprint of the rail sector, we have estimated the direct, indirect and induced contributions of the sector to the UK economy in terms of gross value added (GVA) and employment.

The economic model investigates the economic benefits associated with the rail sector and operates as follows:

1. **Estimation of direct impact:** this is the economic activities and employment creation directly supported by the rail sector. The GVA values covered the rail transport sector (SIC 49.1-2) and part of the warehousing and support activities for transportation sector (SIC 52), extracted from the data provide by the ONS.[xii] Since the ONS did not provide a further breakdown of SIC code 52 (warehousing and support activities for transportation), we have proportioned the contribution attributable to the rail sector using the relevant employment figures. The employment figures are derived from ONS Business Register and Employment Survey and the Northern Ireland Statistics and Research Agency, using the same SIC codes. Since these databases provide a more granular breakdown, we were able to use the relevant figures directly.
2. **Derivation of indirect and induced impact:** The input-output model is used to estimate the indirect and induced effects of the gross value added generated by the rail sector.
    - Indirect impact: includes other industries that supply goods and services to the rail sector.
    - Induced impact: refers to other industries affected by the spending of the rail sector' employees.

To derive the indirect and induced output multipliers, Type I and Type II Leontief Inverse matrices are employed to generate the indirect and induced GVA per unit of output multipliers. The indirect and induced benefits are calculated by using these multipliers from the direct benefits derived earlier.

[xii] ONS, 12 May 2023, GDP output approach – low-level aggregates, https://www.ons.gov.uk/economy/grossdomesticproductgdp/datasets/ukgdpolowlevelaggregates

Endnotes

[1] Source: https://dataportal.orr.gov.uk/media/v1ilmjut/passenger-rail-usage-oct-dec-2023.pdf

[2] We make the assumption that the car, air, and bus miles that are being shifted to rail would follow the baseline trajectory of emissions reductions before accounting for other net zero policies. This is consistent with the CCC's calculations for the sixth carbon budget and implies that technological measures reduce the emissions from the remaining demand after mode shift and other behavioural change has been achieved. Whilst there would be some baseline reductions in emissions by 2035, absent climate change policy, it is uncertain how these would vary between modes. Hence, for simplicity, we use today's emissions factors.

[3] Source: https://dataportal.orr.gov.uk/media/v1ilmjut/passenger-rail-usage-oct-dec-2023.pdf

[4] To note, in 2021 UK Census data, it was reported that 49% of people did not work from home.

[5] Source: https://dataportal.orr.gov.uk/media/v1ilmjut/passenger-rail-usage-oct-dec-2023.pdf

[6] Research on Long-Term Passenger Demand Growth for the Railway Industry Association, Final Report, February 2024, Steer

[7] More detail on this study can be found at this link, accessed on 28th August 2024: New insight into links between transport and land value | University of Leeds

[8] For more detail, see this paper from the LSE, accessed on 27th August 2024: A meta-analysis of the impact of rail stations on property values: Applying a transit planning lens (lse.ac.uk)

[9] Research on Long-Term Passenger Demand Growth for the Railway Industry Association, Final Report, February 2024, Steer

[10] National Travel Survey 2023 data shows that 55% of respondents use the railway at least once a year, equivalent to about 37 million people.

[11] Transport analysis guidance - GOV.UK (https://www.gov.uk/guidance/transport-analysis-guidance-tag)

[12] As these benefits are already included in the total passenger benefit figures, they cannot simply be added on top of the total passenger benefits when calculating the total value of the rail network.

[13] Source: Greener | National Rail

[14] Source: Greener | National Rail

[15] Source: Government conversion factors for company reporting of greenhouse gas emissions - GOV.UK (www.gov.uk) that report average domestic air travel emissions (including indirect effects of non-CO2 emissions) as 0.237kgCO2e per passenger km compared to 0.035kgCO2e per passenger km for rail

[16] Source: Green Travel Pledge | Rail Delivery Group

[17] Department for Transport: Reported road collisions, vehicles and casualties tables for Great Britain – Table RAS0203: Rates by mode, including air, water and rail modes.

[18] Allen, H. How Public Transport Contributes to Inclusive Communities.

[19] Church, A., Frost, M., & Sullivan, K., 2000. Transport and social exclusion in London. Transport Policy, 7(3), 195-205.

[20] Existing industry commitments to improving accessibility include: continuing improvements to the Passenger Assist service; support for the National Rail Accessibility Strategy (NRAS); raising awareness of the Disabled Persons Railcard (DPRC); improving accessibility for customers and employees alike by engaging with subject matter experts, who provide lived experience of differing disabilities; and, taking the data from the station accessibility review (a comprehensive assessment on the accessibility of each station on the network) to ensure all accessibility information on stations is up-to-date and accurate.

[21] Source: Department for Energy Security & net zero, 2022 UK Greenhouse Gas Emissions, Final Figures. Available at: https://assets.publishing.service.gov.uk/media/65c0d15863a23d0013c821e9/2022-final-greenhouse-gas-emissions-statistical-release.pdf" to the end of this footnote

[22] Source: Climate Change Committee, "Surface transport", The Sixth Carbon Budget, Sector-summary-Surfacetransport. pdf (theccc.org.uk)

[23] Modal comparisons (TSGB01) - https://www.gov.uk/government/statistical-data-sets/tsgb01-modal-comparisons

[24] We make the assumption that the car, air, and bus miles that are being shifted to rail would follow the baseline trajectory of emissions reductions before accounting for other net zero policies. This is consistent with the CCC's calculations for the sixth carbon budget and implies that technological measures reduce the emissions from the remaining demand after mode shift and other behavioural change has been achieved. Whilst there would be some baseline reductions in emissions by 2035, absent climate change policy, it is uncertain how these would vary between modes. Hence, for simplicity, we use today's emissions factors.

[25] TAG unit A4-1 social impact appraisal - https://www.gov.uk/government/publications/tag-unit-a4-1-social-impact-appraisal

[26] Department for Transport, Reported road collisions, vehicles and casualties tables for Great Britain - RAS0203: Rates by mode, including air, water and rail modes.

[27] See latest ORR data, published here and accessed on 27th August 2024: https://dataportal.orr.gov.uk/media/15nga1q4/passenger-rail-usage-jan-mar-2024.pdf

[28] See, for example, this report from Retail Week on the sustained impact of cost of living challenges on physical / in-store retail: https://reports.retail-week.com/how-theyll-spend-it-2024/index.html

[29] https://dataportal.orr.gov.uk/media/v1ilmjut/passenger-rail-usage-oct-dec-2023.pdf

[30] This assumes that spending is similar between the outbound and return legs. The spending totals do not include spending on the train or spending at the destination on return journeys.

[31] See note 18 for more detail on existing accessibility commitments.

[32] Oxera, 2014. What is the contribution of rail to the UK economy? Available from: https://www.oxera.com/wp-content/uploads/2018/07/Contribution-of-rail-to-the-UK-economy-140714.pdf.pdf

[33] Research on Long-Term Passenger Demand Growth for the Railway Industry Association, Final Report, February 2024, Steer

[34] The GJT data is split by ticket type (full price, reduced or season ticket) but, as we did not have passenger flow data split by these ticket types, we took a simple average of GJT, as GJT is similar across all three.

[35] In the RUDD dataset, Generalised Journey Time is defined as journey time + penalty in minutes for service frequency (headway penalty) + penalty in minutes for interchange. It does not include an estimate for a crowding penalty, so our estimates are likely an underestimate of the true change.

[36] Note that our analysis focuses exclusively on journeys, as opposed to legs. A journey is defined as the distance travelled between an origin and destination station. It can therefore encompass multiple trip legs if there are changes of train involved.

[37] Oxera, 2014. What is the contribution of rail to the UK economy? Available from: https://www.oxera.com/wp-content/uploads/2018/07/Contribution-of-rail-to-the-UK-economy-140714.pdf.pdf

[38] Wheat, P and Wardman, M (2017) Effects of timetable related service quality of rail demand. Transportation Research Part A: Policy and Practice,95. pp. 96-108. (available at: Effects of timetable related service quality of rail demand (whiterose.ac.uk))

[39] TAG data book - https://www.gov.uk/guidance/transport-analysis-guidance-tag. We used the version updated on 30th May 2024.

[40] DfT Statistics NTS0409b: Average distance travelled by purpose and main mode (miles per person per year): England, 2002 onwards.

[41] TAG unit A1-3 user and provider impacts - https://www.gov.uk/guidance/transport-analysis-guidance-tag

[42] TAG data book - https://www.gov.uk/guidance/transport-analysis-guidance-tag. We used the version updated on 30th May 2024.

[43] DfT Statistics NTS0409b: Average distance travelled by purpose and main mode (miles per person per year): England, 2002 onwards.

[44] Greener | National Rail

[45] Government conversion factors for company reporting of greenhouse gas emissions - https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting

[46] Allen, H. How Public Transport Contributes to Inclusive Communities.

[47] Church, A., Frost, M., & Sullivan, K., 2000. Transport and social exclusion in London. Transport Policy, 7(3), 195-205.

[48] Department for Transport: Reported road collisions, vehicles and casualties tables for Great Britain – Table RAS0203: Rates by mode, including air, water, and rail modes.

[49] DfT Statistics NTS9904a: Average distance travelled by mode and region of residence (miles per person per year). Note there is no data for Wales, so we have used the average for all regions, and for Scotland, we have used data on total rail passenger miles from https://www.transport.gov.scot/publication/scottish-transport-statistics-no-39-2020-edition/ and updated with data from https://www.transport.gov.scot/publication/scottish-transport-statistics-2022/chapter-07-rail/

[50] Source: Nomis – regional breakdown downloaded from "Population projections - local authority based by single year of age" dataset

[51] DfT Statistics: TSGB0101: Passenger transport by mode from 1952. Modal comparisons (TSGB01) - https://www.gov.uk/government/statistical-data-sets/tsgb01-modal-comparisons

[52] RAND Europe, Bus fare and journey time elasticities and diversion factors for all modes (https://www.rand.org/pubs/research_reports/RR2367.html)

[53] Government conversion factors for company reporting of greenhouse gas emissions - https://www.gov.uk/government/collections/

government-conversion-factors-for-company-reporting. We make the assumption that the car, air, and bus miles that are being shifted to rail would follow the baseline trajectory of emissions reductions before accounting for other net zero policies. This is consistent with the CCC's calculations for the sixth carbon budget and implies that technological measures reduce the emissions from the remaining demand after mode shift and other behavioural change has been achieved. Whilst there would be some baseline reductions in emissions by 2035, absent climate change policy, it is uncertain how these would vary between modes. Hence for simplicity we use today's emissions factors.

[54] Department for Transport, Reported road collisions, vehicles and casualties tables for Great Britain - RAS0203: Rates by mode, including air, water and rail modes.

[55] Table A4.1.1 from TAG data book - https://www.gov.uk/guidance/transport-analysis-guidance-tag. We used the version updated on 30th May 2024.

[56] TAG unit A5-4 marginal external costs - https://www.gov.uk/guidance/transport-analysis-guidance-tag

[57] TAG data book - https://www.gov.uk/guidance/transport-analysis-guidance-tag. We used the version updated on 30th May 2024.

[58] DfT Statistics NTS0409b: Average distance travelled by purpose and main mode (miles per person per year): England, 2002 onwards.

[59] TAG unit A2-1 wider economic impacts - https://www.gov.uk/guidance/transport-analysis-guidance-tag

[60] Oxera, 2014. What is the contribution of rail to the UK economy? Available from: https://www.oxera.com/wp-content/uploads/2018/07/Contribution-of-rail-to-the-UK-economy-140714.pdf.pdf

[61] RAND Europe, Bus fare and journey time elasticities and diversion factors for all modes (https://www.rand.org/pubs/research_reports/RR2367.html)

[62] Labour market and skills projections: 2020 to 2035 - https://www.gov.uk/government/publications/labour-market-and-skills-projections-2020-to-2035

[63] Department for Transport National Travel Survey, table NTS0409a. This figure is national and to produce our regional estimates we have used this figure throughout as a simplifying assumption. Our estimates could be further refined using regional data on journey purpose by mode which we did not have for this analysis.

[64] Ciccone, A. and Hall, R.E. (1996): 'Productivity and the density of economic activity', American Economic Review, 86, pp. 54–70.

[65] Based on the ONS definition of Built-up Areas with a population of over 75,000 described here: Towns and cities, characteristics of built-up areas, England and Wales - Office for National Statistics https://www.ons.gov.uk/peoplepopulationandcommunity/housing/articles/townsandcitiescharacteristicsofbuiltupareasenglandandwales/census2021

[66] UK gross value added (GVA) and productivity estimates for other geographies - Office for National Statistics https://www.ons.gov.uk/peoplepopulationandcommunity/housing/articles/townsandcitiescharacteristicsofbuiltupareasenglandandwales/census2021

[67] Source: Office for Budget Responsibility, Data, long-term economic determinants - March 2024 Economic and fiscal outlook, https://obr.uk/data/.

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